



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

grow vertical from that time (and point) upward, and at maturity shows the curve and tangent as in Fig. 11.

Nearly all the trees growing on the down-stream end of bottoms, show the lean as in Fig. 11, and some show the bend at the bottom. The young trees, at ten years, show very little inclination as compared with the grown and old ones.

I saw a case in the north-east part of Brown county, before mentioned, on the south side of Jesse Walker's farm (section, township and range forgotten), where a "worm" rail fence had been built on the south boundary line across the bottom of a small stream or brook, the bottom not over 300 feet across. The fence had been built straight, and about eight rails high. The sediment carried from the fields on the adjacent hills during rains, was caught by the grass and so silted up that the bottom rails were submerged. The proprietor kept adding rails to the top as fast as they were submerged at the bottom, so as to keep the necessary height of fence. This continued about fifteen years, when the original eight rails had been entirely covered or submerged, when it was noticed that the fence had been swayed down stream about four to five feet from the original straight line. The sedimentary deposit had certainly moved like a glacier. This coincides with the other facts before stated.

In conclusion, the drift was deposited here by the waters from a receding glacier. The general course of the flow, as indicated by the striations, was about south 15° to 18° west. If my theory is correct, the tendency of the deposit of the drift would be to slide southward. I do not wish to be understood as confidently affirming the correctness of my theory, but that the slope of the hills, the lean of the trees on south-facing hills, taken in connection with the other facts I have cited, strongly suggest my theory as the explanation of the facts. If this theory does not explain the phenomena, what other does? Are there any well-established facts which contradict this theory? If so—what?

—:o:—

RENUMERATION OF THE SPINAL NERVES AND RECONSTRUCTION OF THE PLEXUSES IN THE HUMAN SUBJECT.

BY DR. ELLIOTT COUES.

THERE being a pair of spinal nerves to each vertebral interspace down to the coccyx, and the pair counted first being

above the first cervical vertebra (between atlas and occiput), it obviously follows that the seventh cervical pair is *above* the seventh cervical vertebra. There being but seven cervical vertebræ, "eight cervical nerves" cannot properly be said. For the nerve enumerated and known as "eighth cervical," issuing as it does *above* the first dorsal vertebra, is actually first dorsal, according to the count we start with.

If we agree in the beginning to number and name spinal nerves by the number and name of the vertebra next *below* each one of them, then to reckon eight cervical nerves to seven cervical vertebræ sets the whole series of succeeding nerves wrong by one. The irregularity is obvious, requiring no comment; but how it was brought about is not explained in the ordinary text-books, and the student learns the plexuses with difficulty, instead of with the ease with which he can be taught to know them if the nerves which enter into their composition be counted correctly. Sufficiently complicated as it is at best, the matter may nevertheless be much simplified by a fair count.

The case affords a curious instance of survival of the *unfittest*—a singular oversight of early anatomists having been perpetuated to the present day, and become ingrained in the established numbering and naming of the spinal nerves as grouped into cervical, dorsal, lumbar, sacral and coccygeal sets. It arose in this way: When the cranial and spinal nerves were numbered, the true first spinal (suboccipital, between occiput and atlas) was reckoned a *cranial* nerve; then that one which issues *below* the atlas (between atlas and axis) of course became "first cervical," and succeeding ones were numbered consecutively, that one which issues *below* the seventh cervical vertebra being of course "seventh cervical." Next, when the cranial nerves were revised, the suboccipital was correctly excluded from the cranial set and included in the spinal series, being added of course to the cervical nerves. Thus there then came to be "eight cervical" nerves, for the same lower limit of the "cervical" series was retained. But their collective number and their respective numbers being each raised by one nerve, it was as if their respective positions had each dropped down one vertebra; so that, for example, what had before been seventh and last cervical nerve became then "eighth" and last (between last cervical and first dorsal vertebra). Strangely enough, however, the other spinal nerves were left as

they had been before, the renumeration required to shift the several sets into proper position not having been made. Hence arose that irregularity which has doubtless tried the wits of many a student, puzzled to discover how there can be reckoned *eight* cervical nerves to *seven* cervical vertebræ, though there is one nerve apiece to the dorsal, lumbar and sacral vertebræ, and yet no break in the whole series; how it can be that the first cervical nerve issues *above* the first cervical vertebra, yet the last cervical nerve issues *below* the last cervical vertebra; how it can be a *second* cervical nerve which issues between the first and second cervical vertebræ, yet a "*first dorsal*" which issues between the first and second dorsal vertebræ; and so forth. There is evidently something wrong about this; yet it has become so thoroughly ingrained in our nomenclature and descriptions of these nerves, that a very poor piece of arithmetic somehow looks like a necessary anatomical fact.

The required correction is self-evident, and wrong numbering is very easily rectified. To make the count straight we have only to do for the dorsal, lumbar, sacral and coccygeal nerves what was done for the cervical when the suboccipital was added to that series—drop them all down one vertebra or, what is the same thing, raise them all up one number.¹ Just as what had been in the first place first cervical nerve has now become second cervical, and what had been seventh cervical nerve became eighth cervical; so now, what has hitherto been eighth cervical nerve (8th of the whole series) becomes first dorsal; what has been twelfth dorsal (20th of the whole series) becomes first lumbar; what has been fifth lumbar (25th of the whole series) becomes first sacral; what has been fifth sacral (30th of the whole series) becomes first coccygeal, and what has been first and last coccygeal (31st of the series) becomes second and last coccygeal (see table at end). Of course neither the total of the spinal nerves (31), nor the several sums of the sets of dorsals (12), lumbar (5) and sacral (5) is altered; but there are seven instead of eight to be reckoned cervicals, and two coccygeals instead of one; and the boundaries of each of the sets shifts up one vertebra. By this simple rectification every spinal nerve is regularly numbered and named by the vertebra *above* which it issues (since

¹A nerve is *raised* numerically when, *e.g.*, a sixth becomes a seventh; but it is then *lowered* in position.

we begin that way), instead of being reckoned irregularly, sometimes by the vertebra above it, sometimes by the vertebra below it; and the sets of nerves are all brought into uniform relation with the sets of vertebræ, from occiput down to coccyx. The difference between the reckoning hitherto in vogue and that now proposed may be easily brought to the eye. In the following examples of old and new styles the letters are the vertebræ, the lower figures being their own numbers, but the upper figures are the numbers of the nerves; thus 8d_1 is first dorsal vertebra and so-called eighth cervical nerve. It will be seen that in the first row no numbers correspond with those of vertebræ after 7c_7 , and that in the second row all the numbers correspond as long as nerves hold out. It will also be seen that the lumbar and sacral plexuses are out of order with their respective vertebræ in the first row; and that in the second row the change in numeration brings these plexuses into order with their respective vertebræ (the composition of plexuses being of course the same in either case):

	cv. plex.	brach. plex.	intercostal nerves.
Old style—	$^1c_1, ^2c_2, ^3c_3, ^4c_4, ^5c_5, ^6c_6, ^7c_7$	$^8d_1, ^1d_2, ^2d_3, ^3d_4, ^4d_5, ^5d_6, ^6d_7, ^7d_8, ^8d_9$	$^9d_{10}, ^{10}d_{11}, ^{11}d_{12}$
New style—	$^1c_1, ^2c_2, ^3c_3, ^4c_4, ^5c_5, ^6c_6, ^7c_7$	$^1d_1, ^2d_2, ^3d_3, ^4d_4, ^5d_5, ^6d_6, ^7d_7, ^8d_8, ^9d_9$	$^{10}d_{10}, ^{11}d_{11}, ^{12}d_{12}$
	cv. plex.	brach. plex.	intercostal nerves.
	lumb. plex.	sacr. plex.	
	$^{12}l_1, ^1l_2, ^2l_3, ^3l_4, ^4l_5$	$^5s_1, ^1s_2, ^2s_3, ^3s_4, ^4s_5$	$^6c_1, ^1c_2, ^0c_3, ^0c_4$
	$^1l_1, ^2l_2, ^3l_3, ^4l_4, ^5l_5$	$^1s_1, ^2s_2, ^3s_3, ^4s_4, ^5s_5$	$^1c_1, ^2c_2, ^0c_3, ^0c_4$
	lumb. plex.	sacr. plex.	

It is incumbent upon one who proposes innovations to show good reason for interfering with established usages. In the present case it will be found, on sufficient examination, that not only is the numeration of the spinal nerves properly regulated, so that the several sets of nerves coincide with the sets of vertebræ, but also that the construction of the plexuses may be much more easily appreciated and much more simply described after than before this rectification is made. Moreover, without altering the recognized limits and composition of the plexuses in the least particular, we make them seem much more naturally constructed by simply correcting the numeration of their respective nerves.

Furthermore, the proposed rectification is equally available for other animals than man; and in these it is highly desirable to

have some fixed method of counting nerves, especially those which compose plexuses, with reference to their distribution in cervical, dorsal and other sets. If we agree to know and name any spinal nerve *by the vertebra above which it issues*, we can hardly go astray.

The principal points touching the plexuses of the human subject may be noted in comparing the old with the new style.

1. The cervical plexus is not affected (first four cervical nerves).

2. The brachial plexus falls between the cervical and dorsal sets of nerves in either case, but there is a distinction in favor of the new numeration. The plexus is said to be formed by the last four cervical (5th–8th) and first (1st) dorsal nerves; and it is said that three of the cervical (5th–7th) unite to form the upper cord, while the last (8th) cervical and first (1st) dorsal unite to form the lower cord. I should say that the brachial plexus is formed by the last three (5th–7th) cervicals and first two (1st–2d) dorsals, the former uniting in one cord, the latter in another. Thus the remarkable partition of the brachial plexus into two cords, which extend to the axilla, coincides with its derivation from the two sets of nerves; and further details, such as the union of the two dorsals as soon as they leave their respective foramina, show that the division of the two sets of nerves here made is the natural one.

3. The so-called last (12th) dorsal or intercostal nerve (that issuing between the last dorsal and first lumbar vertebra) is generally noted in the text-books for various peculiarities which relate it to the lumbar series, besides its actual connection with the latter. This nerve is really first (1st) lumbar. The lumbar plexus is variously described as consisting of the last dorsal (12th) and four (1st–4th) or five lumbar nerves (1st–5th), according to whether or not its sacral connection is taken into account. I should say simply that the lumbar plexus is formed by the five lumbar nerves proper (1st–5th), with communicating loop to the sacral plexus. Matters are here greatly simplified by the renumeration. It is well to remember that *all* contiguous plexuses have a communicating loop, both above and below; thus there is one between the cervical and brachial, and one between the lumbar and sacral; but such loops separate plexuses as well as connect them.

4. Another good effect of the renumeration is, that the great nerve called fifth lumbar, issuing between the last lumbar and first sacral vertebræ, and so remarkably distinguished from the rest in size and disposition that is already known as the "lumbo-sacral cord," is taken out of the lumbar series altogether and put where it belongs, in the sacral series, as first sacral. The sacral plexus is commonly said to be formed by the lumbo-sacral cord (5th lumbar) and the four upper sacral nerves (1st-4th) which issue from the completed anterior sacral foramina, or by these and the next nerve below. I should say simply that the sacral plexus is formed by the five (1st-5th) sacral nerves proper. There is of course the loop of communication with the lumbar, as above said, and there is also connection with the coccygeal nerve or nerves; but these are not to be taken into account in defining the plexus. The natural division of this very large but comparatively simple plexus is not into a lumbo-sacral cord (1st sacral) *and* four (2d-5th) sacral nerves, but into the four great upper nerves (1st-4th sacral proper) and the much smaller (5th) sacral one.

5. The remaining very diminutive nerves are connected with the preceding. There being no inter-coccygeal foramina, they are obliged to appear together between the sacrum and coccyx. Nor are they constant in appearing. It is scarcely material whether we consider them merely tributary to the great sacral plexus, or together forming a little coccygeal plexus. I believe it is customary to take them into the sacral plexus, in which case this great plexus is made up of four large cords and two little ones, and a single coccygeal is left alone. The chief point is here, that any nerve or nerves issuing between the sacrum and coccyx must be coccygeal, whether there be one or two, and whatever disposition be made of it or them.

To strip the subject of verbiage as far as possible, I have spoken of the plexuses as formed by the nerves. It is of course understood that I mean their anterior branches in every case. Intercommunications between posterior branches of spinal nerves are not generally treated as plexuses, unless it be those between the 1st-3d cervicals, which some writers formally recognize by such name. The same may be said of connections between cranial and spinal nerves, as that of the hypoglossal. Nor are any of the sympathetic plexuses here brought into question.

It remains to formally tabulate the renumeration of spinal nerves and the reconstruction of the plexuses which I recommend for adoption :

OLD STYLE.				NEW STYLE.			
Plexus, Cervical [Four]	{	N. Cervical First.	1	1. First Cervical N.	{	Cervical Plexus [Four]	
		" " Second.	2	2. Second " "			
		" " Third.	3	3. Third " "			
		" " Fourth.	4	4. Fourth " "			
Plexus, Brachial [Five]	{ [cord, upper]	" " Fifth.	5	5. Fifth " "	{ [upper cord]	Brachial Plexus [Five]	
		" " Sixth.	6	6. Sixth " "			
	{ [cord, lower]	" " Seventh.	7	7. Seventh " "	{ [lower cord]		
		" " Eighth.	8	8. First Dorsal N.			
Intercostals [Ten]	{	N. Dorsal First.	9	9. Second " "	{	Intercostals. [Ten]	
		" " Second.	10	10. Third " "			
		" " Third.	11	11. Fourth " "			
		" " Fourth.	12	12. Fifth " "			
		" " Fifth.	13	13. Sixth " "			
		" " Sixth.	14	14. Seventh " "			
		" " Seventh.	15	15. Eighth " "			
		" " Eighth.	16	16. Ninth " "			
		" " Ninth.	17	17. Tenth " "			
		" " Tenth.	18	18. Eleventh " "			
Plexus, Lumbar [Five]	{	" " Eleventh.	19	19. Twelfth " "	{	Lumbar Plexus. [Five]	
		" " Twelfth.	20	20. First Lumbar N.			
		N. Lumbar First.	21	21. Second " "			
		" " Second.	22	22. Third " "			
		" " Third.	23	23. Fourth " "			
[Lumbo-sacral cord] large	{	" " Fourth.	24	24. Fifth " "	{	large	Sacral Plexus [Five]
		" " Fifth.	25	25. First Sacral N.			
		N. Sacral First.	26	26. Second " "			
		" " Second.	27	27. Third " "			
		" " Third.	28	28. Fourth " "			
		" " Fourth.	29	29. Fifth " "			
small	{	" " Fifth.	30	30. First Coccyg. N.	{ small		
		N. Coccyg. First.	31	31. Second " "			
.....	:	:	:	:	:	:	:

—:O:—

A REVIEW OF THE PROGRESS OF NORTH AMERICAN INVERTEBRATE PALÆONTOLOGY FOR 1883.

BY J. B. MARCOU.

I HAVE taken up the task of preparing this brief review at the request of Dr. C. A. White, who, for several years past, has prepared a similar one, but whose numerous avocations do not leave sufficient time for continuing his publication of such a review.

During the latter part of the year invertebrate palæontology